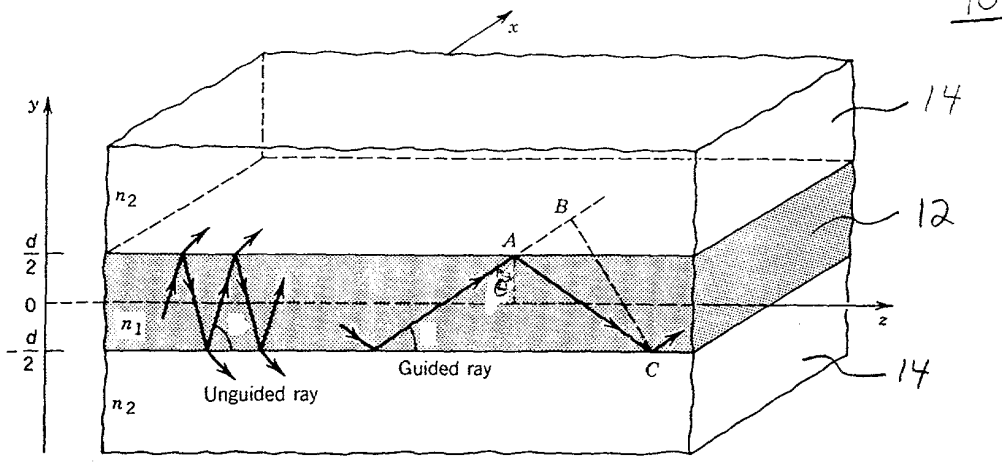
Figure 1


10
x
y
14
12
14
n_2
n_1
n_2
$\frac{d}{2}$
0
$-\frac{d}{2}$
A
B
C
z
Guided ray
Unguided ray

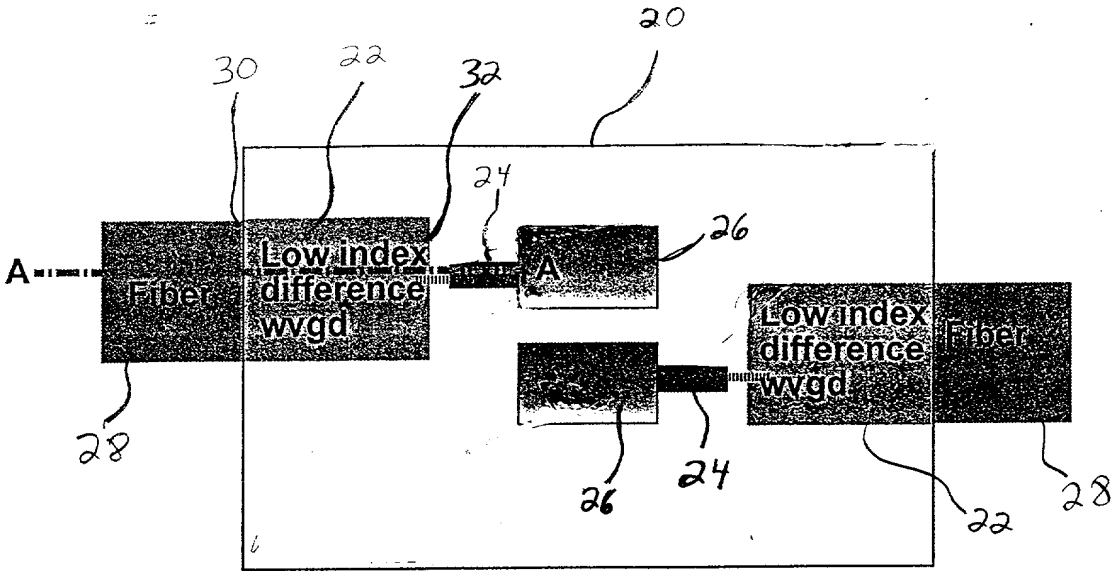

20
30
22
32
24
26
A
Fiber
Low index difference wvgd
A
Low index difference wvgd
Fiber
28
26
24
22
28

Figure 2

Figure 3

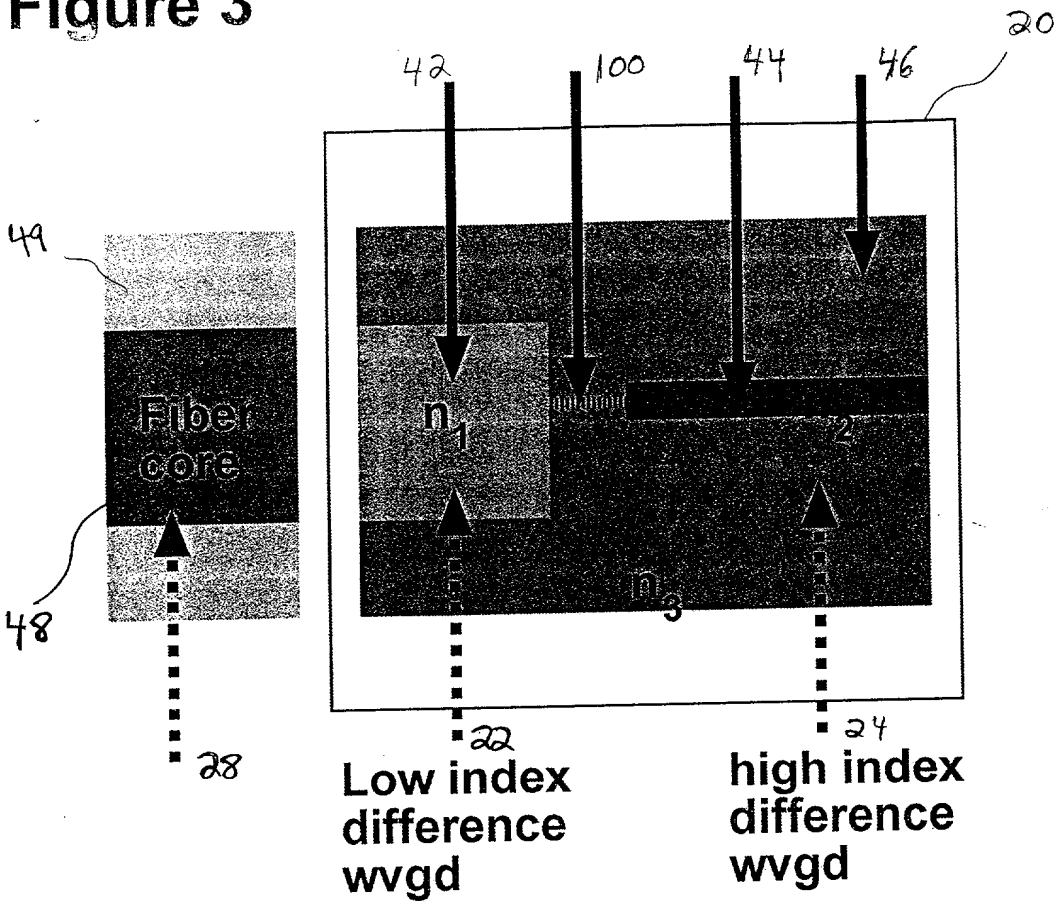

20
42
100
44
46
49
Fiber core
48
n_1
2
n_3
28
22
24
Low index difference wvgd
high index difference wvgd

Figure 4

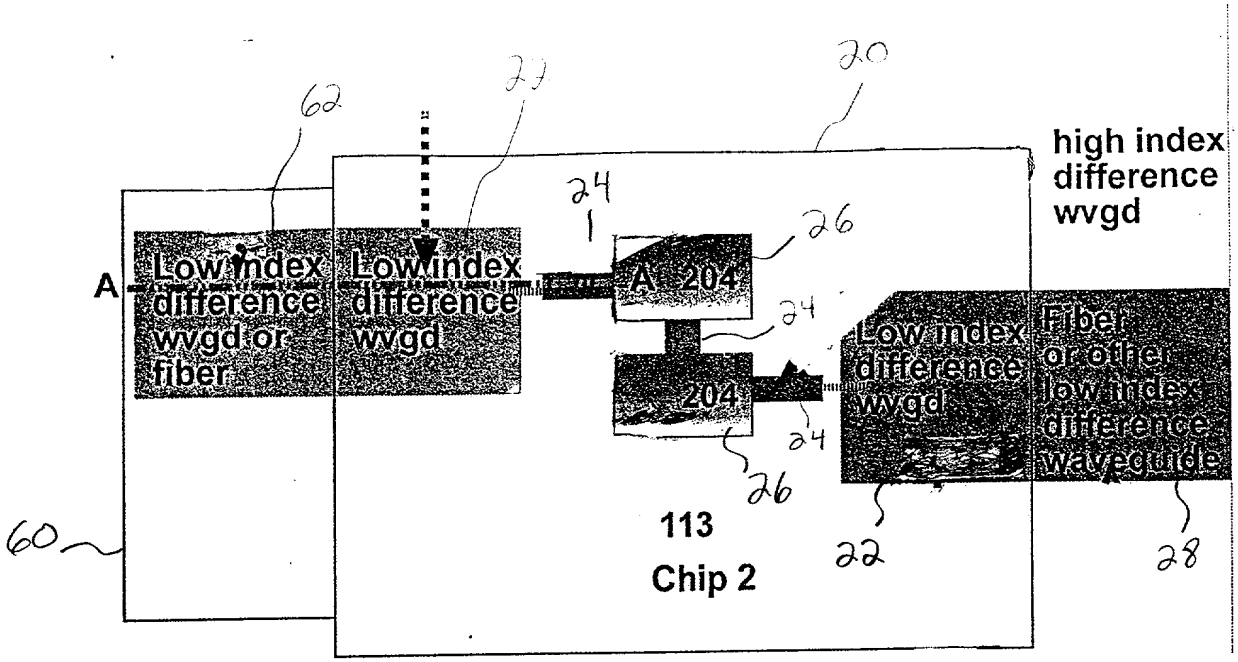
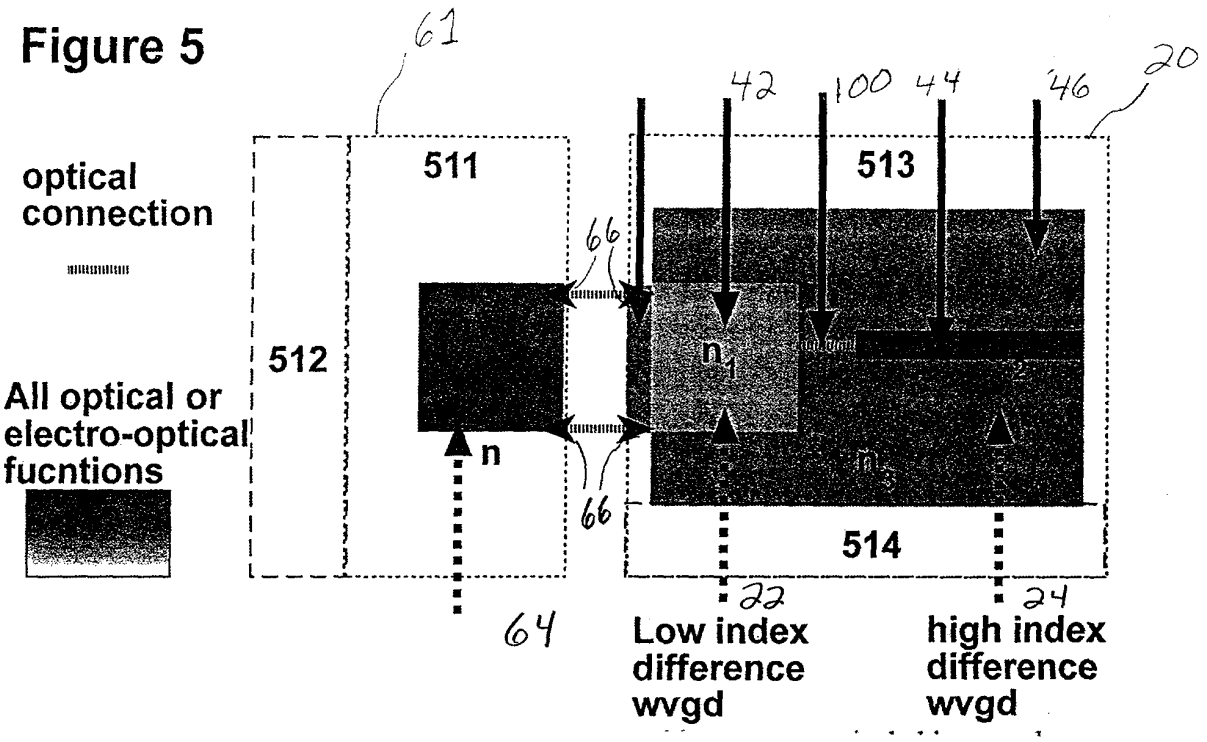

62
21
20
high index difference wvgd
24
26
A
Low index difference wvgd or fiber
Low index difference wvgd
A
204
24
Low index difference wvgd
Fiber or other low index difference waveguide
204
24
26
60
113
Chip 2
22
28

Figure 5


optical connection
All optical or electro-optical fucntions
61
511
512
513
514
42
100
44
46
20
66
66
n
n_1
n_3
64
22
24
Low index difference wvgd
high index difference wvgd

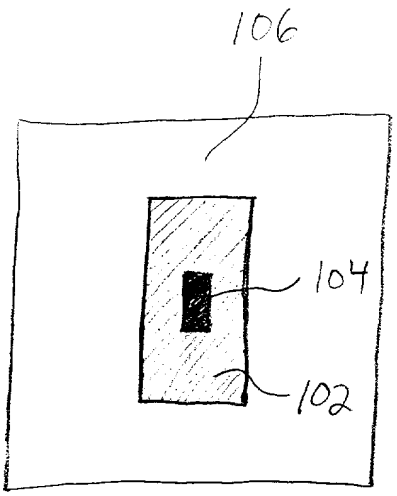


Figure 8

Replacement Sheet

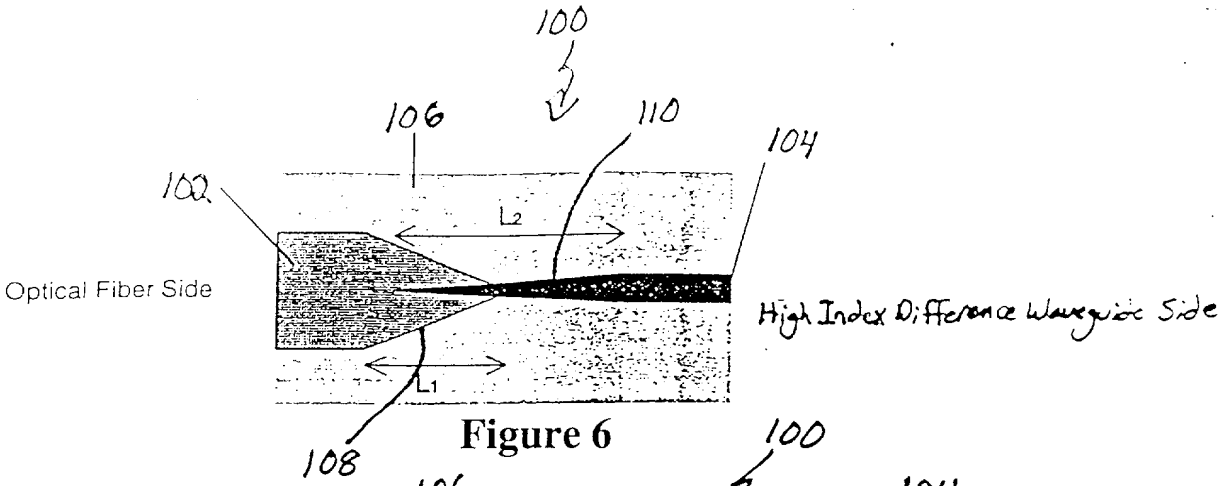


Figure 6

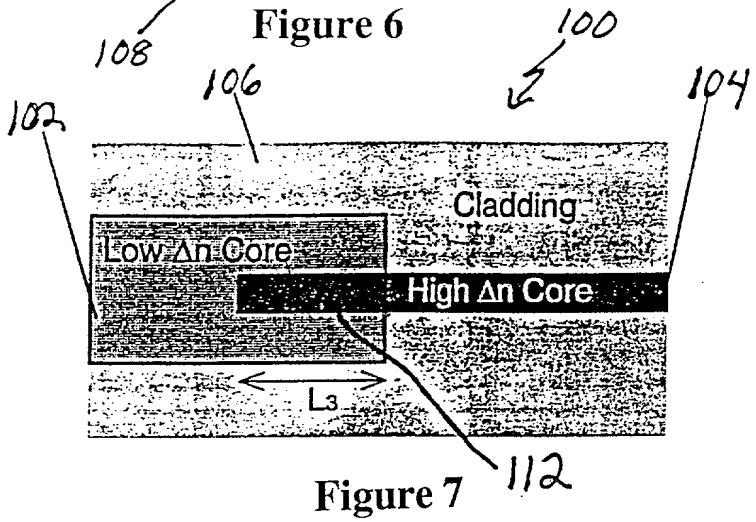


Figure 7

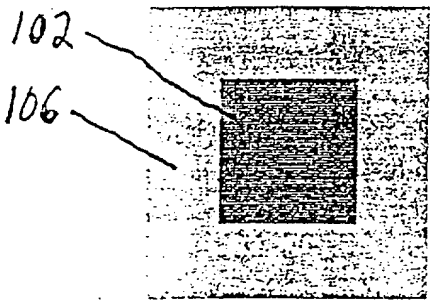


Figure 9

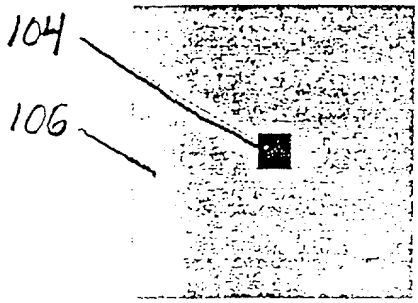


Figure 10

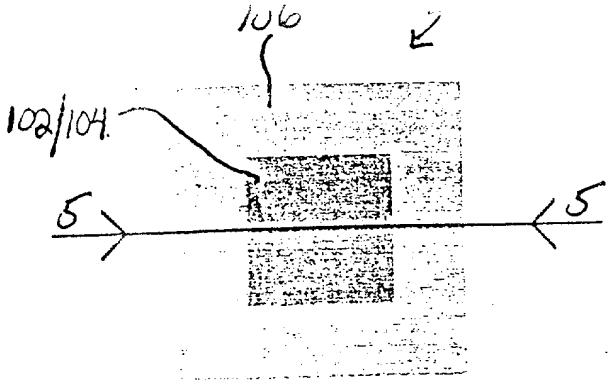


Figure 11A

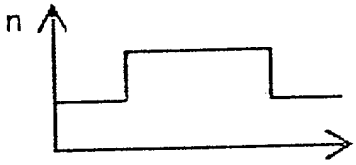


Figure 11B

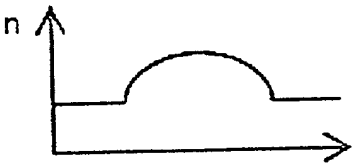


Figure 11C

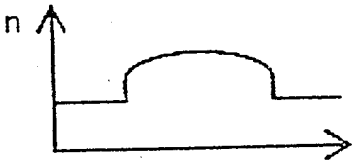


Figure 11D

Figure 11E

Figure 11F

Figure 11G

Figure 11H

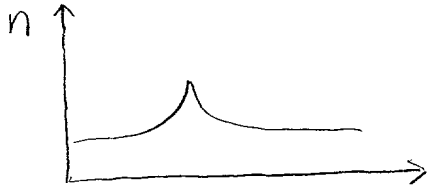


Figure 11 I

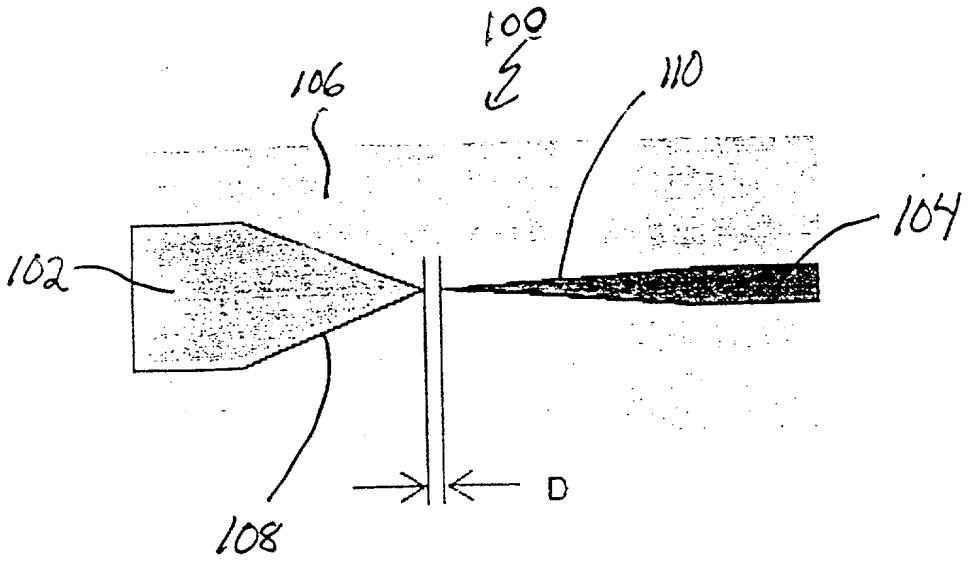


Figure 12

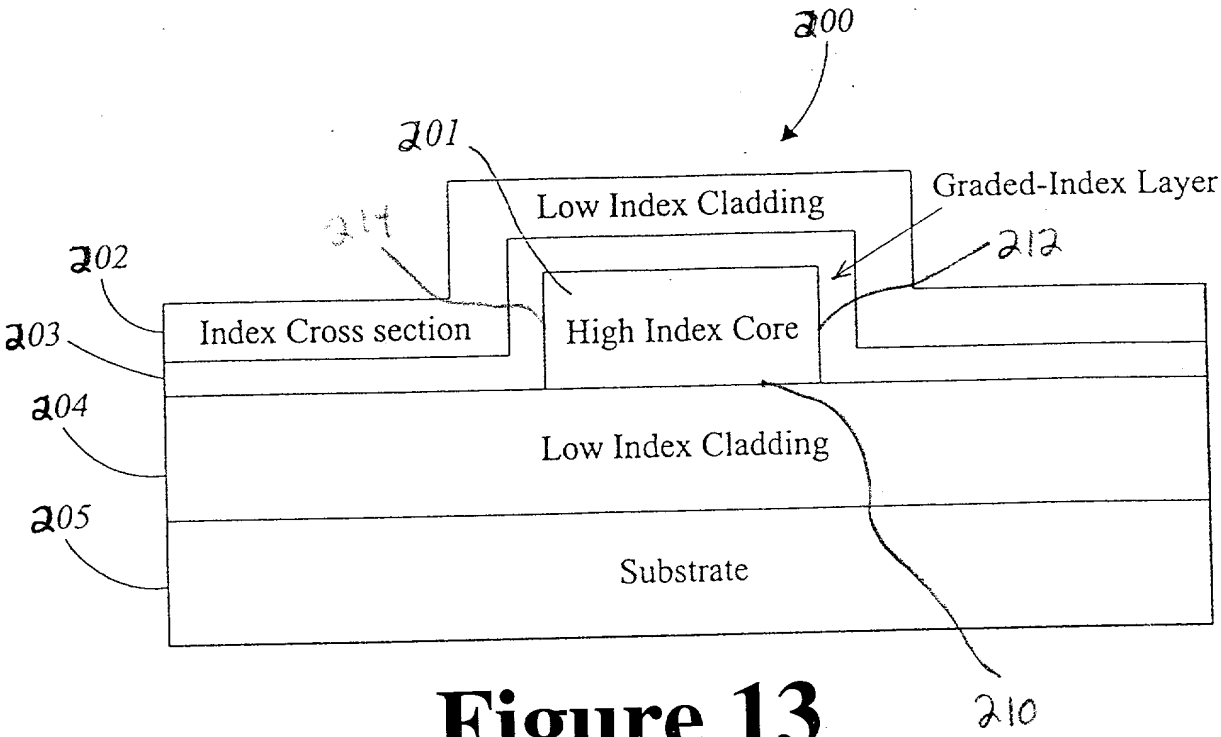


Figure 13

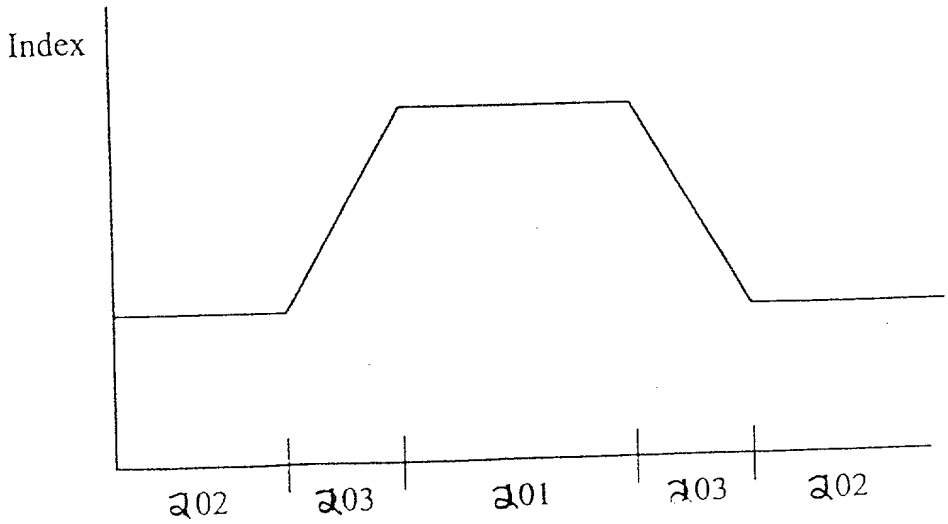


Figure 14

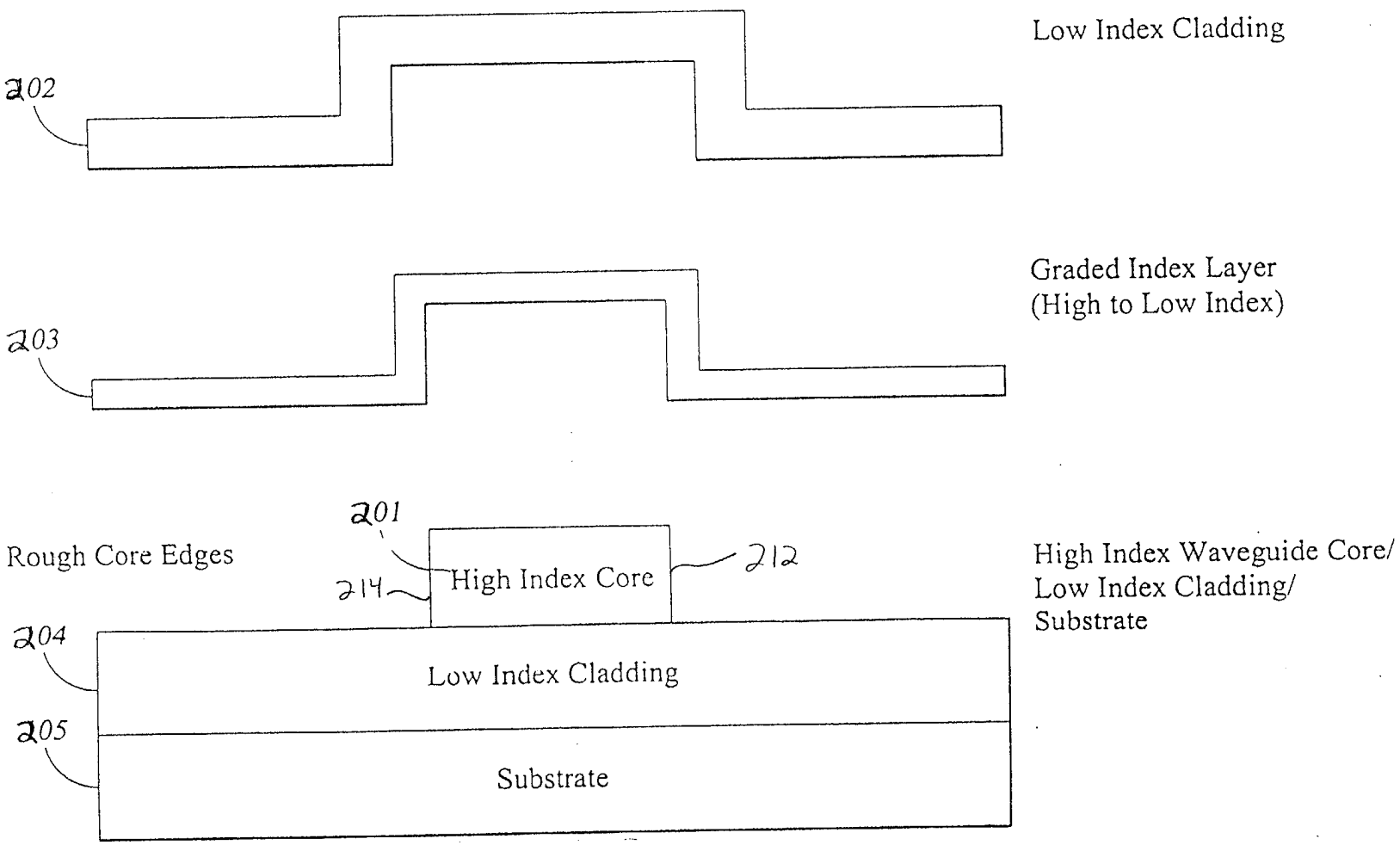

202
Low Index Cladding
203
Graded Index Layer
(High to Low Index)
201
Rough Core Edges
214
High Index Core
212
High Index Waveguide Core/
Low Index Cladding/
Substrate
204
Low Index Cladding
205
Substrate

Figure 15

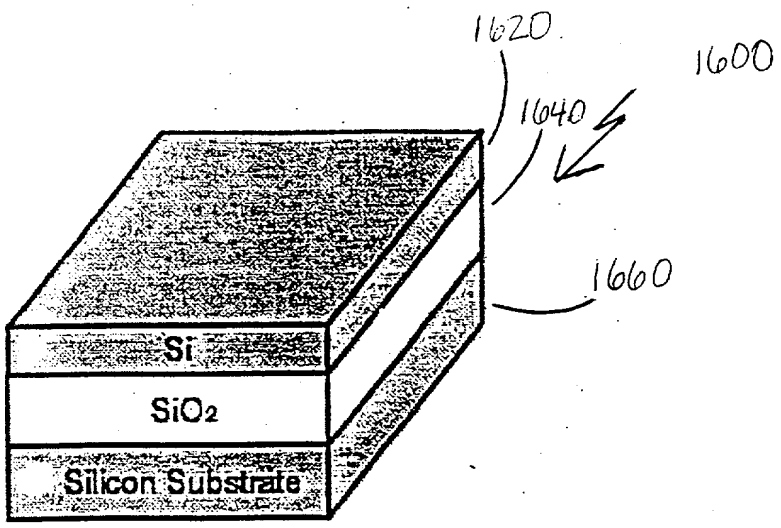


Figure 16

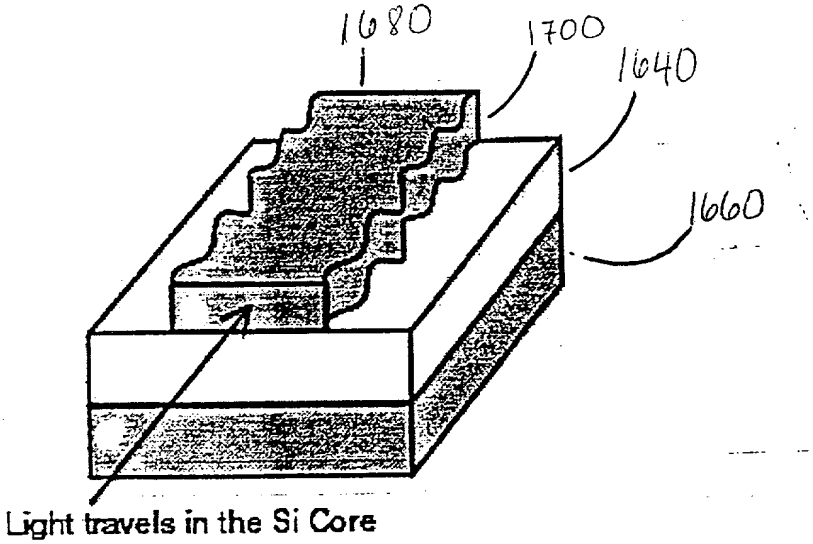


Figure 17

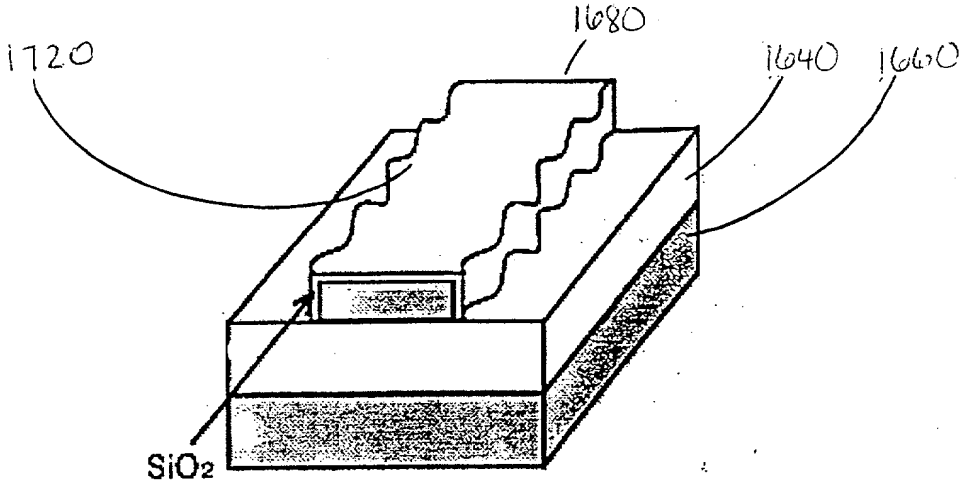


Figure 18

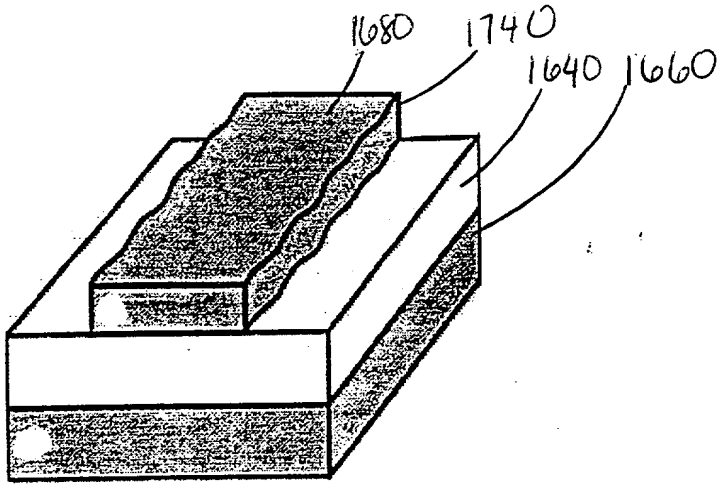


Figure 19

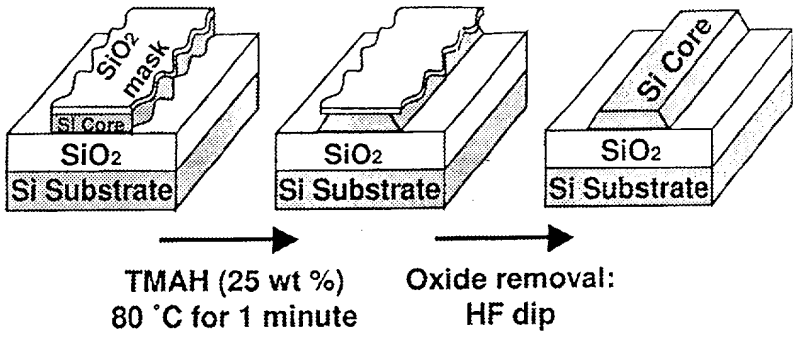

SiO2
mask
Si Core
SiO2
Si Substrate
SiO2
Si Substrate
Si Core
SiO2
Si Substrate
TMAH (25 wt %)
80 °C for 1 minute
Oxide removal:
HF dip

Figure 20.